

SPECIMENS

OF

$\frac{530.435}{3}$

Abbreviated Numbers,

OR, AN

INTRODUCTION

To an Entire New

SPECIES of ARITHMETIC:

CALCULATED

In a more especial Manner for the COUNTING-HOUSE AND PUBLIC OFFICES, particularly the CUSTOMS, EXCHEQUER, AND EXCISE: The Principle being founded on a New Method of finding the Decimal for any Coin, Weight, or Time, &c. &c. By *one single Multiplication only*, WITHOUT THE USE of a VULGAR FRACTION. And also (on a Method *hitherto undiscovered*) of finding the Interest of any Sum,

at any Rate, and for any Time: By one single Multiplication, not exceeding three Figures, without the Assistance of Statings, or Reference to Tables: Reducing the whole Body of Arithmetic, (so far as it relates to General Calculations) to a Synopsis confin'd to the Four first Rules of Arithmetic. The whole founded on a Principle hitherto unattempted, and now first offered to the Public.

By WILLIAM WESTON.

L O N D O N :

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Appointed Number

RIGHT HONORABLE
THE LORDS OF THE
TREASURY

TO THE HONORABLE
THE LORDS OF THE
TREASURY

THE LORDS OF THE
TREASURY

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TO THE
RIGHT HONOURABLE
THE
Earl of HALIFAX,

One of his MAJESTIES Principal
SECRETARIES of STATE, Knight
of the most noble Order of the
GARTER, &c. &c. &c.

MY LORD,



HE unmerited Honour I have
received, in being *permitted* to
Dedicate the following Sheets
to your Lordship, whose Abilities
in Commerce are too well known
to need any Panegyric ; join'd with the good
Opinion you was pleased to express of its
Utility in the PUBLIC OFFICES, will be its
greatest Elogium : For whatever Claim it
might otherwise have had to Merit, it had
perhaps, for ever been buried in Obscurity,
wanting the Advantages of so noble a Pa-
tronage :

DEDICATION.

tronage : For no Talents are so glaringly
Conspicuous, no Abilities so remarkably
Shining, nor any Genius so eminently Dis-
tinguish'd, but that they stand in Need of the
Assistance of the GREAT and GOOD, to
render them acceptable to Mankind : With
these Assurances, the Author lays this little
SPECIMEN of a more general Work, at the
Feet of the EARL OF HALIFAX ; confident
of its Success, and the Approbation of the
World, while protected and approved by so
illustrious a Personage.

I have the Honour to be,

My Lord,

Your Lordship's truly devoted Servant,

WILLIAM WESTON.

P R E F A C E.

AS this little Volume is intended as Introductory to a more general Publication, and is only a SPECIMEN of what is hereafter to be produced on the same Subject (provided this meets with sufficient Encouragement) it may not be unnecessary to say something in respect to the Work; which being replete with Novelty, will consequently require some general Observations, and Explanations from the Author.

It may perhaps be expected I should inform the World, by what Methods this Species of Figures was first discovered; but that is reserv'd for a future Publication: My present Business is only to prove, that FACTORS OR MULTIPLIERS, are now found, that will at one Operation, find the Decimal of any Coin, Weight, Measure, or Time, without the Use or Assistance of a VULGAR FRACTION; and that Decimals so found, will Add, Subtract, Multiply and Divide, with any Decimals found by the usual Methods: And as that is fully evinc'd, by the Actions of the said Factors, on the subsequent Numbers, a Conviction will consequently follow, that working Decimals by these Factors, must render the Operations extremely Easy and Familiar; their Correctness, is also in every Part, fully demonstrated: We may however sometimes find (as in Page 9.) that the

Proof

Proof having not come out quite so Perfect as by the old Method, but that only arises from the Contractions of the Factors ; for were they extended to the extreme Figure, or repeated, their Solutions would be complete, as in Page 18 and 19.

I am inclin'd to believe, that the true Cause that Decimals have been in General so little used in the COUNTING-HOUSES, AND PUBLICK OFFICES, has proceeded from the Length of Time employ'd in finding the Decimal, which join'd with the Operation itself, must certainly have render'd it much more tedious, than even by common Arithmetic. But as that Inconvenience is entirely remov'd, by the Introduction of these Factors ; the PUBLICK OFFICES, especially the CUSTOMS, EXCHEQUER, AND EXCISE, must find great Dispatch, as well as Correctness, by working Decimally with them : And Masters of Academies would do well, to finish the Youth intended for Trade and these Offices, with a perfect Knowledge of the Power of these Factors, instead of Vulgar and Decimal Fractions ; which since this Discovery, must become rather curious than useful.

The concise Method of Valuing, being joined with the brief Method of finding the Decimal ; renders the Discovery perfect, and the General Rule given in this Work for finding the Interest of any Sum, at any Rate, and for any Time, exceeds every Thing hitherto publish'd on that Head : I wish I may be so happy, as to make so successful a Discovery in respect to Discount ; for that would lead to a most noble and extensive Improvement ; for besides its Utility in Discount, it would entirely destroy the Necessity of those Tables, for the Renewal of Leases, and the valuing Annuities upon Lives, which have formerly caus'd so much Labour to Sir Isaac Newton, and Doctor Halley ; as by the Use of these Factors, they would be perform'd with equal Correctness and much greater Expedition : I have indeed already made some little Advances there-
in,

in, having found the Rebate of any Sum at Five per Cent. for one Year. And also the Rebate on £100 for any Number of Days, by one single Operation, and in Respect to general Calculations in Discount, I at present bring out my Solutions, nine Figures less than Mr. Hatton, who I believe is allow'd to have given the most concise Method hitherto publish'd.

By this Mode of Numbers, there is perhaps explor'd a Path that may lead to numberless Improvements, and among others, the perfect Abolition of all Tables of Common Interest, as every Person who works with these Factors, will find a much quicker Answer than from any Tables now Extant; nay, were they even perform'd with equal Expedition, I think the Method here given would be impartially prefer'd, as that puerile Insipidity would be avoided, that attends a Reference to common Tables, for Solutions in real Business.

On the same Principle that the Decimals are found for Coin, Avoirdupoise, Troy-Weight, and Time, as given in the Specimen; I have also found these for Beer and Ale Measure, Wine Measure, Cloth Measure, Long Measure, Wool Weight, Apothecaries Weight, and Time consider'd as a Lunar Year: The same Rule would also hold good, in respect to Foreign Weights and Measures, whereby this Discovery becomes General. I have also found a Method on a Principle somewhat Similar, of valuing all Exchanges in Europe and America, with at least Half the Number of Figures as at present used; but in a more especial Manner its Brevity is manifested, in the American and West-Indian Exchanges, where the Advance is per Centum; which Improvement will also render useless those Voluminous and long labour'd Tables already published on that Head. In Reality, it is hard to say to what the Power of these Numbers can be restricted, or to what they cannot be apply'd: But as a general Consideration and Experience of the above
Effects

Effects will exceed the Intent of this little Volume, it is needless to enlarge on that Head; and as this Book is introduc'd as a Specimen of the Truth of my Allegations, if it meets the Approbation of the Public, a general Publication will consequently follow. But I have perhaps already said too much in Favour of my own Productions, I shall therefore conclude with Observing, that in Order to prevent Impositions on the Public, by spurious Editions, I have not only enter'd it in the Hall-Book of the Company of Stationers: But have also sign'd every Preface with my own Hand Writing, and such Books as want that Authenticity, are Pyrated and Incorrect.



THE



SPECIMENS

OF

ABBREVIATED NUMBERS, &c.



S the Intention of this little Book is not to enlarge on the Methods of Working Figures by the General Rules already received, it will be needless to take any Notice thereof; the Reader being supposed to be already perfectly conversant in Arithmetic, in Order that he may the more readily distinguish the Use and Correctness of this New Method: But should it even fall into the Hands of those, whose Education may only have made them Masters of the FOUR FIRST RULES, *viz* Addition, Subtraction, Multiplication, and Division; they will immediately find themselves capable of solving all general Questions, by the Use of *Multiplication only*; with equal Exactness with him who by long Labour and Studies at the Schools, shall be capable of Working in by Fractional and *Decimal* Operations;

B for

for all Questions in the Rule of Three, where *Unity* is one of the Numbers ; as well as all Operations in Practice, and Interest, may be immediately solv'd by the Knowledge of Multiplication only ; and all Solutions where Decimals are required, can at once be performed by these New Discovered Factors.—Having made these little Observations, it will be necessary to prove the Truth of them, by beginning with



REDUC-



REDUCTION OF DECIMALS.

THE general Use whereof *has been* to change any Coin, Weight, Measure, &c. into a Decimal, by first bringing the given Numbers into a Vulgar Fraction, and that Fraction into a Decimal: But as the Intent of this Book, is to explode and render useless *all Operations by Vulgar Fractions*, so far as they relate to Decimals; it will be needless, as I before observed, to introduce their Manner of Working, except to shew the great Advantages gained by this NEW METHOD, which is performed by the Multiplication of certain given *Factors*, or Numbers, which are contained in the following Table; and will be of as little Burthen to the Memory, as the Pence Table in Common Arithmetic.

A T A B L E

Of FACTORS, to be used as Multipliers, for the Reducing any Coin, Weight, Measure, Time, &c. &c. &c. into a Decimal Fraction, by one single Operation only, *viz.*]

AVOIRDUPOISE WEIGHT, *the Integer an Hundred Weight.*

Multiply by 893 to find the Decimal of any Number of Pounds.

558 - - - - - any Number of Ounces.

349 - - - - - any Number of Drams.

TROY WEIGHT, *the Integer a Pound.*

Multiply by 834 to find the Decimal of any Number of Ounces.

417 - - - - - any Number of Pennyweights.

174 - - - - - any Number of Grains.

COIN, *the Integer a Pound Sterling.*

Multiply by 5 to find the Decimal of any Number of Shillings.

417 - - - - - any Number of Pence.

1042 - - - - - any Number of Farthings.

TIME, *consider'd as a Calendar Year of 12 Months.*

Multiply by 275 to find the Decimal of any Number of Days.

834 - - - - - any Number of Months.

193 - - - - - any Number of Weeks.

N. B. As this is intended but as a Specimen, I have only introduced Examples of the three most useful Cases, *viz.* Weight, Coin, and Time; (*until I see what Reception this Innovation in Figures will meet with.*) And for the Working thereof, take the following

GENERAL RULE.

MULTIPLY the given Coin, Weight, &c. &c. by the given FACTOR as in Whole Numbers, and the Product is the Decimal, placing your Point of Separation, and prefixing Cyphers where necessary. To illustrate which Rule,—I shall first begin with Examples in

C O I N.

Example 1.

WHAT Decimal Parts of a Pound, are equal to 16 Shillings?

Look in the Table under Coin, and you will find the Factor or Multiplier to be 5, to find the Decimal of any Number of Shillings; therefore,

$$\begin{array}{r} 16 \text{ the given Shillings} \\ \times \text{ by } 5 \text{ the given Factor} \\ \hline \end{array}$$

Produce ,80 the Decimal required.

Note, Cyphers must sometimes be prefix'd to the Product, before the Decimal Point is placed, in Order to make the Decimal of its true Value; to perform which, in all Coins, Weights, Measures, &c. &c. &c. take the following General

R U L E.

If the Decimal is the next inferior Denomination to the Integer, *no Cypher must be prefixed.*

If the *second* inferior Denomination, *one Cypher.*

If the *third* inferior Denomination, *two Cyphers.*

If the *fourth* inferior Denomination, *three Cyphers.*

And so on to the greatest Decrease, in a regular Increase of Cyphers.

ILLUS-

ILLUSTRATION of the First Example.

Here Shillings being the next inferior Denomination to Pounds, (the given Integer) no Cypher is prefix'd; and the Decimal is ,8 = 16 Shillings.

Example 2.

Find the Decimal of Nine Pence.

The *Factor* for Pence, is 417; therefore Nine Pence (the given Sum) must be multiplied into 417, viz.

$$\begin{array}{r} 417 \text{ the Factor for Pence} \\ \times \text{ by } 9 \text{ the given Pence} \\ \hline \end{array}$$

Produces 3753

But Pence being the second inferior Denomination to Pounds, one Cypher must be prefix'd according to the Rule; and the Decimal will be thus

,03753 *the Decimal of 9 Pence.*

Example 3.

Find the Decimal of three Farthings.

$$\begin{array}{r} 1042 \text{ the Factor for Farthings} \\ \times \text{ by } 3 \text{ the given Farthings} \\ \hline \end{array}$$

Produces 3126

Here Farthings being the third inferior Denomination to Pounds, (the given Integer) two Cyphers must be prefixed; and the Decimal will stand thus

,003126 *the Decimal of three Farthings.*

Note,

Note, There is one Exception to the General Rule, that in the Decimal of ONE SHILLING a Cypher must always be prefix'd.

Example 4.

Find the Decimal of £0 .. 17 .. 9 .. $\frac{3}{4}$.

By the Old Method, they must first be reduced into the following Vulgar Fractions, $\frac{1}{20}$ $\frac{9}{240}$ $\frac{3}{800}$ Then

20)17 00(,85 Decimal of 17 Skillings

160

—

• 100

100

—

•••

240)9,0000(,0375 Decimal of 9d.

720

—

1800

1680

—

• 1200

1200

—

••••

960)3,000000(,003125 Decimal of $\frac{3}{8}$

2880

—

• 1200

960

—

• 2400

1920

—

• 4800

4800

—

••••

Then

Then, .85 the Decimal of 17 Shillings
 .0375 the Decimal of 9 Pence
 .003125 the Decimal of 3 Farthings

Produce .890625 the Decimal of 17s. 9d. $\frac{3}{4}$

17,812500

12

9,750000

4

3,000000 Proof

By the New Method it is performed THUS, viz.

17 Shillings

x by 5 the Factor for Shillings

Produce 85

9 Pence

x by 417 the Factor for Pence

Produce 3753

3 Farthings

x by 1042 the Factor for Farthings

Produce 3126

Then, as mentioned in the General Rule, *one* Cypher being prefix'd to the Product of Pence, and *two* before that for Farthings, you will find the Decimal by this Operation to be

85 - - - for the Shillings -
 03753 for the Pence
 003126 for the Farthings

890656 Decimal of 17s. 9d. $\frac{3}{4}$

20

17,813120

12

9,757440

4

3,029760 Proof

This Proof does not come out quite so near as the other, but as delicate Calculations are not required in Trade, the Consequences are not material; and as it answers sufficiently for any Calculations in Business, by bringing out the exact Sum; the Excess in the remaining Decimal is not worth observing. See PREFACE.

The Usefulness of this New Method of Calculating, may be at once seen by comparing the Number of Figures used in each Operation of this last Example, viz.

By the Old Method there are used 121 Figures

By the New Method - - - - - 41

80 Saved

Therefore there are saved by this Method of Calculation in this *small* Example, 80 Figures.

Example 3.

Find the Decimal of 14s. 10d. $\frac{3}{4}$.

By the Old Method these Fractions $\frac{14}{20}$ $\frac{10}{240}$ $\frac{3}{960}$ are to be reduced to a Decimal, viz.

C

20)

$$\begin{array}{r} 20) 14,0(,7 \\ 140 \\ \hline \dots \end{array}$$

$$\begin{array}{r} 960) 3,000000(,003125 \\ 2880 \dots \\ \hline \cdot 1200 \\ 960 \\ \hline \cdot 2400 \\ 1920 \\ \hline \cdot 4800 \\ 4800 \\ \hline \dots \end{array}$$

$$\begin{array}{r} 240) 10,0000(,0416 \\ 960 \dots \\ \hline \cdot 400 \\ 240 \\ \hline 1600 \\ 1440 \\ \hline \cdot 160 \\ \hline \cdot 7 \\ ,0416 \\ ,003125 \\ \hline \text{Produce } ,744725 \end{array}$$

The Decimal of 14s. 10d. $\frac{3}{4}$ by the *Old Method*.

By the New Method.

$$\begin{array}{r} 14 \text{ Shillings} \\ \times \text{by } 5 \quad 10 \text{ Pence} \\ \hline ,70 \quad \times \text{by } 417 \\ \hline 4170 \quad \times \text{by } 1042 \\ \hline 3126 \quad \times \text{by } 1042 \\ \hline 70 \\ ,04170 \\ ,003126 \\ \hline \text{Decimal of 14s. 10d. } \frac{3}{4} \quad ,744826 \end{array}$$

Having said sufficient on the Manner of finding the Decimal of Coin, by this New Method; I shall, (in Order to make it of general Utility,) shew also, how the said Decimals may be valued by

I N-

INSPECTION; that the common tedious Methods of valuing them, may be avoided; I am very sensible, that there is a Method already discovered of valuing Coin by Inspection, by doubling the first Place of Decimals for Shillings:—But as the Intention of this Publication is to explore new Paths, and point out such Methods as our Forefathers do not appear to have known, I shall pass by the Inaccuracy of such Methods, and give the following new discovered one, of which, this is the general

R U L E.

Multiply the three first Figures of the given Decimal, by 2; then separate as many Figures to the Right Hand, as are contained in the Multiplied Decimal, less than *One*, and the Figures to the Left Hand will be Shillings; then dividing the Figures to the Right Hand by 2, the Quotient will be the Number of Farthings; observing to make an Abatement of 1 at 25, 2 at 50, &c. Let us take the two preceding Examples in Page 9 and 10, by Way of Illustration.

890 the three first Figures of the given
x by 2 [Decimal

Produce 17,80

One Figure less than the Figures of the Multiplied Decimal being separated, will leave 17 Shillings, and a Remainder of 80; which divided by 2, will give 40 Farthings; from whence One being taken as exceeding 25, will produce 17s. 9d. $\frac{1}{2}$.

Second Illustration.

744 the three first Figures of the given
x by 2 [Decimal

Produce 14,88

14 Shillings; and the Half of 88 is 44, from whence One being taken as exceeding 25, leaves 43 or 10d. $\frac{3}{4}$; and produces a Valuation of the said Decimal, = 14s. 10d. $\frac{3}{4}$.

Note, If the Decimal has not 3 Places, the whole Decimal must be taken.

Example.

Value ,05 of a Pound Sterling.

$$\begin{array}{r} 05 \\ 2 \\ \hline \end{array}$$

1,0 or One Shilling for the Decimal.

This Example having only 2 given Figures, 1 Figure is only separated to find the Decimal required.

Example.

Value ,50 of a Pound Sterling.

$$\begin{array}{r} 2 \\ \hline \end{array}$$

10,0 = £0. 10. 0.

Value ,49 of a Pound Sterling.

$$\begin{array}{r} 2 \\ \hline 9,8 \end{array}$$

Cyphers being premised to extend to Infinity always on the Right Hand, as in Decimal Arithmetic; the 8 in this Remainder stands as 80, the Half of which is 40, from which One being taken, leaves 39 or 9d. $\frac{3}{4}$; so the Decimal ,49, is equal to 9s. 9d. $\frac{3}{4}$.

These three Examples are sufficient General Rules for all Operations in *Coins*, I shall therefore now proceed to give the Method of working these Factors in

A VOIR.

By the New Method,

the given 72 lb.

× by 893 the Factor for Pounds

$$\begin{array}{r} 216 \\ 648 \\ 576 \\ \hline \end{array}$$

Produce ,64296 *the Decimal of 72 lb.*

$$\begin{array}{r} 4 \\ \hline \end{array}$$

$$\begin{array}{r} 2,57184 \\ 28 \\ \hline \end{array}$$

$$\begin{array}{r} 757472 \\ 317368 \\ \hline \end{array}$$

16,01152 = Proof 29. 16. or 72lb.

Nothing more need be said to shew either the Saving of Figures, the Correctness of the Work, or expeditious Brevity of these Operations; as it must be obvious to every impartial Person on the first Inspection.

Note, *Whenever the Decimal of Pounds becomes to be added with an inferior Decimal, the last Figure on the Right Hand is always to be expung'd.*

Example.

Find the Decimal of 72lb. 14 Ounces.

72 lb.
× by 893 Factor for Pounds

$$\begin{array}{r} 216 \\ 648 \\ 576 \\ \hline \end{array}$$

Produce ,64296 *Decimal of 72 lb.*

14 Ounces

14 Ounces
 x by 558 Factor for Ounces

$$\begin{array}{r}
 112 \\
 70 \\
 70 \\
 \hline
 7812 \text{ Produce}
 \end{array}$$

The same Rule holds good here, as in Coin, in Respect to placing the Cyphers to make the Decimal of its true Value; therefore the Integer being 1 Hundred Weight, Pounds become the next inferior Denomination, because the 2q. 16lb. are brought into Pounds; but were the Quarters first valued, the Pounds would become second in Denomination, and require a Cypher prefix'd: But as it is now consider'd as the next inferior Denomination, no Cypher is prefix'd; and the Decimal stands thus

,6429 - - the Six being expung'd as per Rule
 ,007812

Answer ,650712 Decimal of 72lb. and 14 Ounces

Example.

Find the Decimal of 2qrs. 23lb. 14oz. 13 drams.

By the *Old Method* the following Multiplication will be found necessary, in Order to find the Denominators to the Ounces and Drams, to prepare the general Fraction, viz.

$$\begin{array}{r}
 112 \\
 16 \\
 \hline
 672 \\
 112 \\
 \hline
 1792 \text{ Denominator for Ounces}
 \end{array}$$

1792 Denominator for Ounces
16

10752

1792

28672 Denominator for Drams

Then the prepared Fraction will stand thus;

$\frac{2}{3} \frac{3}{4} \frac{1}{2} \frac{1}{3}$

4)20(.5 Decimal for the two Quarters

20

—

00

112)23,0000000(.2053571 Decimal for the 23lb.

224 ·····

600

560

400

336

640

560

800

784

160

112

48

1792) 14,00000000 (,0078125 *Decimal of 1402*

12544...

• 14560

14336

•• 2240

1792

• 4480

3584

• 8960

8960

....

28672) 13,00000000 (,0004534 *Decimal of 13dwt*

114688

• 153120

143360

• 97600

86016

115840

114688

•• 1152

Decimal of 2 Quarters - - - ,5

of 23 lb. - - - - - ,2053571

of 14 oz. - - - - - ,0078125

of 13 dwt. - - - - - ,0004534

,7136230

The Decimal of 2qrs. 23lb. 14oz. 13dwt. by the
OLD METHOD.

D

By

By the New Method.

893 *Factor for Pounds*
 x by 79 *the Pounds in 2qrs. 23lb.*

8037
 6251
 ———
 Produces, 70547

558 *Factor for Ounces*
 x by 14 *Number of Ounces*

2232
 558
 ———

Produces 7812

349 *Factor for Drams*
 x by 13 *the Number of Drams*

1047
 349
 ———

Produces 4537

Cyphers being prefix'd according to Rule given
 in Page 5, the Decimal will stand thus,

,7054 *the Seven expung'd*

,007812

,0004537
 ———

,7136657 the Decimal of 2qrs. 23lb. 14oz. 13drs.
 The small Excess arises from the Addition of
 the great Number of Decimal Parts, the Reason
 of which see *Troy Weight*.

Now let us inspect the Operation by the *Old*
Method, and we shall find that the Number of
 Figures (Proof not included) will amount to 261
 By the New Method the Figures used are only 71

Saved in the Working - - - - - 193

GENE-

GENERAL OBSERVATION.

In finding the Decimal by these Factors, Observe that for the Decimal of one Pound, TWO Cyphers must always be prefix'd; and for the Decimal of any Number of Pounds to Eleven inclusive, ONE Cypher must be prefix'd; and from Twelve upwards, Nothing.

Enough having been said of the Method of finding the Decimal, by the Use of the given Factor; let us next consider the Method of valuing the Decimal immediately by *Inspection*, without the Tedioufness of a long Multiplication; for which take the following general

R U L E.

Take the three first Figures of the given Decimal, and multiply by 2, and the Product is the Solution in Ounces, deducting 1, for every ten, with this Exception, that when the Decimal has Cyphers prefix'd, the last Figure is to be expung'd, and the three first reckon'd as Ounces; and if in dividing by 16 to bring any of the Products into Pounds, there are any Remainders equal to, or less than 4, such Remainder is to be consider'd negatively; but if the Remainder exceeds 4, such Remainder *deducting* 4, will be Ounces.

Examples.

Value 0016 of an Hundred Weight,

2

0032 here the 2 must be expung'd, which leaves 3, equal to 3 Ounces, the Cyphers being as *nothing*.

D 2

Value

Value ,00893 of an Hundred Weight,

2

0178 here the 8 is cast out, and leaves 17, in which there being one 10, an Unit must be cast out, which leaves 16 Ounces = 1 lb.

Value ,01786

2

034 = 2 lb. nearly

Value 02679

2

052 deduct 5 for the Tens, and it = 3 lb. nearly.

Value ,03572

2

070 deduct 7 there remains 63 or 4 lb. nearly.

Value ,04465

2

088 deduct 8 for the Tens, = 5 lb. exactly,

REMARK.

You have doubtless notic'd, that the Answers of two, three, and four Pounds, are express'd to come out only NEARLY: But that arises from the taking so few Figures of the Decimal for *Brevity's sake*; for was the whole Decimal to be multiply'd by 2, the Solution would be full: But

But as this is not confin'd to problematical, or extreme nice or curious Calculations, but for the Use of Merchants and Public Offices, where the Loss of a *Farthing* in a Million, or an Ounce in a Tun is immaterial; the Calculation is sufficient for the End proposed: But let this Remark be illustrated, by taking the full Decimals of the 2, 3, and 4 Pounds beforementioned, viz.

,01786 is the Decimal of 2lb.

2

,03572 Deduct 3 for the Tens and there remains 320Z. or 2lb. EXACTLY.

2dly. ,02679 is the Decimal of 3lb.

2

,05358 Deduct 5 for the Tens, and there remains 480Z. or 3lb. EXACTLY.

3dly. ,03572 is the Decimal of 4lb.

2

,07144 Deduct 7 for the Tens, and there remains 640Z. or 4lb. EXACTLY.

Indeed, in the Operations in Decimals, by the Old, Common Method, whenever there is a Remainder in the Fraction, such Remainder will always make a Fractional Decimal; and when such Decimal comes to be valued, there will always be a *Plus* or *Minus* in the Solution, i. e. an Excess or Deficiency. But to proceed,

Value ,05358 of an Hundred Weight.

2

106 deduct 10 = 96 Ounces, or 6 Pounds.

Value

Value ,06251

2

124 deduct 12 for the Tens = 112 Ounces, or 7 Pounds.

Value ,07144

2

142 = 8lb.

Value ,08037

2

160 = 9lb.

Value ,08930

2

178 = 10lb.

I have abated 18 in this last Deduction, altho' but 17 Tens, because 8 is so near the Abatement that it becomes necessary; indeed, all General *Axioms* must be also assisted with the Reason of the Operator in Trifles.

Having experienced the Validity of this Invention as far as Ten Pounds, we will now proceed to Large and General Operations: and begin first with the 3 before recited Examples, viz. first of 72lb. in Page 13.

Value ,642857133 of an Hundred Weight.

2

1284 — 128 = 1156 Ounces; which ÷ by 16, gives 72lb. and a Remainder of 4; which, by the Given Rule must be expung'd, and the Valuation becomes perfect.

Value

Value ,650712 of an Hundred Weight.

2

1300 — 130 = 1170 Ounces which $\div$
by 16, gives 72lb. and a Remainder
of 18; from which deduct 4, the
exact Solution of 72lb. and 14 Oun-
ces remains. See Page 15.

Value ,7136657 of an Hundred Weight.

2

1426 — 143 = 1283 Ounces; which $\div$
16, gives 79lb. and a Remainder of
19; from which deduct 4 there re-
mains 15 Ounces, and the Decimal is
79lb. and 15 Ounces; sufficiently
near for any Calculations in Trade:
But would you have them perfect,
multiply the whole Decimal by 2,
as before-mentioned. See Page 17
and 18.

For further Proof of the Truth of these Ope-
rations, I refer the Reader to make his own
Experiments from any occuring Varieties; hav-
ing *here*, sufficiently proved their Validity, and
shall therefore proceed to

T R O Y W E I G H T .

FIND the Decimal of 9 Ounces.
x by 834 Factor for Ounces.

Produce ,7506 which being the next
inferior Denomination to the Integer, requires no
Cypher to perfect the Decimal.

Find

Find the Decimal of 3 Ounces.

× by 834

$$2502 = 3 \text{ oz.}$$

Find the Decimal of 14 Pennyweights.

× by 417 *Factor for Pennyweights.*

5838 but this being the second inferior Denomination to the given Integer, one Cypher must be prefix'd to compleat the Decimal, and it will stand thus $.05838 = 14$ Pennyweights.

Find the Decimal of 16 Grains.

× by 174 *Factor for Grains.*

2784 but this being the third inferior Denomination to the given Integer, two Cyphers must be prefix'd, and the Decimal will stand thus $.002784 = 16$ Grains.

Let us compare the different Methods of Operation, (*i. e.*) the Old and New, by the following Example.

Find the Decimal of 4oz. 17dwts. 22Grains.

By the Old, or Common Method of Operation, these Vulgar Fractions must be chang'd, *viz.* $\frac{4}{12}$ $\frac{17}{240}$ and $\frac{22}{3760}$.

Then,

$$12)4,000$$

333 *Decimal of the Ounces.*

240)17,00000(,07083 *Decimal of the Pennyweights.*

1680

.. 2000

1920

.. 800

740

60

5760)22,0000000(,0038194 *Decimal of the Grains.*

17280

47200

46080

.. 11200

5760

54400

51840

.. 25600

23040

.. 2560

Decimal of 4 Ounces ,333

17 Pennyweights ,07083

22 Grains ,0038194

Decimal of 4 Ozs. 17 Dwt. 20 Grs. ,4076494

By the New Method.

834
× by 4

Produce 3336

417
× by 17

Produce 7089

E

174

$$\begin{array}{r}
 174 \\
 \times \text{by } 22 \\
 \hline
 348 \\
 348 \\
 \hline
 \end{array}$$

Produce, ,003828 *the Decimal of 22 Grains*
 ,07089 *the Decimal of 17 Pennyweights*
 ,333 *the Decimal of 4 Ounces*

 ,407718 *Dec. of 4 ozs. 17 dwts. 20 grs.* *

Used by the Old Method	148 Figures
By the New Method	<u>48</u>
	saved 100 Figures.

* *N. B.* In adding the Sum Total of the Decimals by the *Factors*, the 6 is omitted according to the Rule given in Avoirdupoise ; yet in the Proof of *each* Operation, they come out 2 Grains short, owing, in the Old Method, to the Remainder of the several Divisions not being decimated and added ; and in the *New*, to the Factors not being continued to a greater Number of Places ; both which are needless in these Calculations in Trade. *But at any Time*, should the Grains be required, or indeed any single Number, as Ounces, Pounds, Drams, &c. &c. it is only finding the Decimal single of each Number ; for in the *Old Method*, as well as in the *New*, you see by the Additions of inferior Fractions with larger, that their Value is increased in a certain Progression, according to the Extent of the fractional Parts of the superior Decimal ; for were each of the preceding Decimals to be found separately, you would find the Proofs answer correctly, as for *Example*,

By

By the New Method the Decimal

For 4 Ounces is ,3336
12

Proof 4,0032 Ounces

For 17 Pennyweights ,07089.
12

,85068
20

Proof 17,1360 Pennyweights

For 22 Grains, 003828
12

,45936
20

,918720
24

3674880
1837440

Proof 22,049280 Grains

Answer 4 Ounces, 17 Pennyweights, 22 Grains.

N. B. Although the 6 is not cast out in this Operation, yet we shall find that was it not expung'd in the Addition of the other Work, that the Total instead of being ,407718. would be ,408318. which being valued, will amount to 4 Ounces, 17 Pennyweights, 23 and upwards of $\frac{3}{4}$ making as great an Excess with the Addition of 6, as it abates when it is expung'd. But as the Doctrine of *Surds*, or broken *Quantities*, is a

Matter not intended to be entered into in this little Treatise; I shall content myself with observing, that as the same Inconvenience arises from the *Old* and established Principles, my *Innovation* can be no ways injured by being liable to the same Defects: But as the Cause is assign'd, and the Method for a nice Valuation laid down, I think the Intent sufficiently answer'd. And it must be observed, that by not adding the last Figure to the Right in the greatest Decimal, abates about as much, as it increases when it is added; for 1,544320 added to the first Example, would make it exactly 22 Grains; so 1,911680 Grains subtracted from the latter Remainder of the Valuation, would bring it exactly to the 22 Grains, which Decimal of 1,91168 is made from the several Remainders for

	Grains
,0032 Ounces	will give 1,5360
,01360 Pennyweights	,32640
and the Grains themselves give . .	049280

which added together make 1,911680 from whence it is evident, that in these gross Calculations, the remaining Decimal Fractions will always make an Increase in the Working; and that from the beforementioned Observations, the Casting out the last Figure of the greatest Decimal, will always bring it to a Proportion sufficiently near, for any Calculation in Trade, to which it may be apply'd.

I shall now proceed to make this Rule also of general Use, by giving a Method of valuing the Decimal of a Pound Troy by *Inspection*, where the Decimal has no Cypher, or one only; for which take this General

RULE.

R U L E.

Take the 3 first Figures of the Decimal, and multiply by 2, adding 2 for every 10, placing Units under Units, and Tens under Tens, and the Total of that Addition after separating the last Figure to the Right Hand, will be the Answer in Pennyweights.

Examples.

Value ,7506 of a Pound Troy.

$$\begin{array}{r} 2 \\ \hline 1500 \\ \text{Add } 300. \text{ or } 2 \text{ for every Ten} \end{array}$$

Pennyweights) 18,000 *The last Figure to the Right cast away leaves 180 Pennyweights, which divided by 20, the Pennyweights in an Ounce; leaves 9 Ounces.*

Value 2502 of a Pound Troy.

$$\begin{array}{r} 2 \\ \hline 500 \\ \text{Add } 100 \text{ or } 2 \text{ for every Ten, and it} \\ \hline \text{gives } 60 \text{ Pennyweights or } 3 \\ 600 \text{ Ounces.} \end{array}$$

Value ,407718 of a Pound Troy.

$$\begin{array}{r} 2 \\ \hline 814 \\ 162 \\ \hline 97)6 \text{ cut off the 6 and there re-} \\ \text{mains } 97 \text{ Pennyweights.} \end{array}$$

Note,

Note, When the Figure is separated it is the supposed Parts of a Pennyweight divided into 8 Parts, which is tolerable near, making in this Instance $\frac{6}{8}$ or 18 Grains, but should be 20. It is however sufficient for the Purpose intended, and the Operations for finding a proper Multiplier for the lowest Denominations would be exceeding tedious.

Value ,05838 of a Pound Troy.

2

,116	}	here 4 is given for the 16 Pound,
24		as it exceeds 15 as mentioned
		before in Avoirdupoise Weight.
14,0 Pennyweight.		

The Reader, may further illustrate the Certainty of these Operations, by his own Practice ; we will next see, how far these Factors may be depended upon in respect to

T I M E.

It will be necessary in this Place to say something in respect to Time, as it was sometimes considered as a Calendar of 12 Months, and sometimes as a Lunar Year of 13 Months : But as the First is probably more eligible than the latter, in respect to Interest ; I have made my Factors for the Calendar Year.

I confess great Altercations might be made, and much Ink spilt, by taking up either Side of the Question ; but the Controversion of such Points, I shall leave to wiser Heads, it being my Purpose to advance nothing but what can be supported by Demonstration ; and shall therefore proceed

ceed in my little Work, by giving some Examples
in *Time*, viz.

Find the Decimal of 175 Days:

By the Old Method there is this Operation, viz.
 $\frac{175}{365} 175,00000000 (,47945219$ Decimal of
 175 Days

1460

• 2900

2555

• 3450

3285

• 1650

1460

• 1900

1820

• • 800

730

• 701

365

3350

3285

• • 65

,47945219

• 365

289726095

287671314

143835657

175,00004935 Proof.

By

By the New Method.

175 the Given Days
x by 274 the Factor for Days

$$\begin{array}{r}
 700 \\
 1225 \\
 350 \\
 \hline
 47950 \text{ Decimal required} \\
 365 \\
 \hline
 239750 \\
 287700 \\
 \hline
 143850
 \end{array}$$

175,01750 Proof.

Find the Decimal of 4 Months, the Integer a Year.

x by 4
834 the Factor for Months

Answer 3336
 12

4,0032 Proof.

Find

Find the Decimal of 11 Months.

× by 834 *the Factor for Months*

Answer .9174 *the Decimal required*
12

11,0088 *Proof.*

Find the Decimal of 3 Weeks

× by 193 *the Factor for Weeks*

Produces 579 here, Weeks being the Second inferior Denomination to a Year, (the given Integer,) one Cypher must be prefix'd, and the Decimal will be .0579 for 3 Weeks

52

1158

2895

3,0108 *Proof.*

But the best and most certain Method of valuing any Thing under a Month is to reduce them into Days, and multiply them by the Factor for Days; Observing, that for every Number of Days, up to Three *inclusive*, Two Cyphers must be prefix'd to compleat the Decimal, and from 4 to 29 Days, *both inclusive*, one Cypher must be prefix'd; and for all above that Number, *nothing*.

F

Examples.

Examples.

Find the Decimal of 21 Days = 3 Weeks.
 × by 274 the Factor for Days

$$\begin{array}{r} \text{---} \\ 84 \\ 147 \text{---} \\ 42 \text{---} \end{array}$$

prefixing a Cypher, 05754 gives the Decimal requir'd

$$\begin{array}{r} 365 \\ \text{---} \\ 28870 \\ 34524 \\ 17264 \end{array}$$

21,00210 Proof.

Find the Decimal of 37 Days.
 × by 274 the Factor for Days.

$$\begin{array}{r} \text{---} \\ 1918 \\ 822 \end{array}$$

1,0138 Decimal of 37 Days.

In finding the Decimal for any Number of Days, from 30, inclusive, although it is the third Denomination, inferior to the given Integer, and according to the preceding Rules, should have two Cyphers prefix'd. Yet in the Instance of Days, it finds an Exception; for in any of these Decimals for Days above 30, as before observ'd, the Decimal becomes perfect without the Assistance of the Cypher: Let us take the Proof of the above Decimal for 37 Days for an Illustration.

,10175

(35)

510138

365

50690

60828

30414

37,00370 Proof.

Having given sufficient Examples and Proofs of the Correctness and Brevity of this Innovation in Respect to Decimal Arithmetic, and its Operations in the Four most essential Rules, *viz.* Coin, Avoirdupoise Weight, Troy Weight, and Time; I shall proceed to shew their Use and Brevity in the 2 Capital Mercantile Rules, *viz.* Practice, and Interest.

F 2

ILLUS.

ILLUSTRATIONS IN PRACTICE.

WHAT is the Amount of 736 cwt. 2 qrs.
18 lb. at £ 2..12..6 per cwt.

893 Factor for Pounds
× by 74 the Pounds in 2 qrs. 18 lb.

3572
6251

,66082 Decimal of 2 qrs. 18 lb.

Then 736,66082 the Decimal of the Weight
× by 2,625 the Decimal of the Money

168330410
147332164
441996492
147332164

Produce 1933,73465250 = £ 1933..14..8 $\frac{1}{4}$.

But in Trade, two Figures, or Three at the most being retained in the Fractional Parts, will bring out your Answer sufficiently near, and greatly shorten the Operation, as in the following Example.

736,66

736,66—here 082 of the Decimal is omitted

2,625

368330

147332

441996

147332

$$1933,73250 = £ 1933..14..7 \frac{3}{4}.$$

sufficiently near for any such large Calculations ;
but as the Cutting off these Fractions, will always
suppose a small Decrease, your own Judgment in
valuing the Fraction, will always make you give
an Advantage.

But the foregoing Question may be shortened,
by the following Method of multiplying the De-
cimals, viz.

736,6608

526,2

1473322

441996

14733

3683

$$1933,734 = £ 1933..14..8 \frac{1}{4}$$

For the Reason, and Method of abbreviating
these Multiplications, I refer the Reader to any
of the Books on Common Arithmetic.

Example.

Example 2.

Find the Amount of 342 cwt. 2 qrs. 23 lb. 14 oz.
13 drs. at £ 54 14 s. 10 d. $\frac{3}{4}$. per cwt.

349 Factors for Drams
× by 13 the Number of Drams

1047

349

Produces 4537

558 Factor for Ounces
× by 14 the Number of Ounces

2232

558

Produces 7812

893 Factor for Pounds
× by 79 the Pounds in 2 qrs. 23 lb.

8037

6251

Produces 70547

Then the last Figure being omitted, 7054 the Decimal of 79 lb.

,007812 - - - of 14 oz.

,0004537 - - - of 13 drs.

q. lb. oz. dr.

The Decimal of 2..23..14..13 = ,7136657 the Sum Total
of these Additions.

Then

Then $\times$ by the Decimal of £ 54..14..10 $\frac{3}{4}$. which is 54,74488. but being revers'd according to the short Rule of Multiplication, will make the Multiplier stand as under, viz.

342,7136657 Decimal of the Weight
88447,45 - - - Decimal of the Coin revers'd.

1713568

137085

23990

1371

137

27

4

Answer 18761,82 = £ 18761..16..4 $\frac{3}{4}$. the Truth of which Operation is demonstrated by the following Proof thereof, by the Rule of Three, viz.

If

<i>cwt. q. lb. oz. drs.</i>	<i>£. s. d.</i>	<i>lb.</i>
If 342 2 23 14 13	1876 11 16 4 $\frac{3}{4}$	1
4	20	112
1370	375236	112
28	12	16
10963	4502836	672
2742	4	112
38383	18011347	1792
16	28672	16
230302	36022694	10752
38384	126079429	1792
614142	108068082	28672
16	144090776	
	36022694	
3684855	9826285)516421341184 (4) 52555	
614143	49131425	
9826285	121 13138, 3	
	•25107091	
	19652570	109,4. 10
	•54545211	£. 54..14310 $\frac{3}{4}$.
	49131425	<i>Proof of</i>
	•54137868	<i>the foregoing</i>
	49131425	
	•50064434	
	49131425	
	••933009	

Having hereby prov'd its Accuracy, by the Rule of Three, let us see with how much more Difficulty and Incorrectness, it is work'd by the Rule of Practice, than by the Method given in the preceding Abbreviations.

Example.

Example.

cwt. q. lb. oz. drs. £. s. d.
 342..2..23..14..13 at 54..14..10 $\frac{3}{4}$ per
 54 [Cents.

		1368			
s.		1710			
10	$\frac{1}{2}$	171			
4	$\frac{1}{5}$	68	8		
6d.	$\frac{1}{8}$	8	12		
2	$\frac{1}{3}$	2	17		
2	$\frac{1}{3}$	2	17		
$\frac{1}{2}$	$\frac{1}{4}$		14	3	
$\frac{1}{4}$	$\frac{1}{2}$		7	1	$\frac{1}{2}$
2qrs.	$\frac{1}{2}$	27	7	5	$\frac{1}{4}$
16lb.	7	7	16	5	
4	$\frac{1}{4}$	1	19	1	$\frac{1}{4}$
2	$\frac{1}{2}$		19	6	$\frac{1}{2}$
1	$\frac{1}{2}$		9	9	$\frac{1}{4}$
8oz.	$\frac{1}{2}$		4	10	$\frac{1}{2}$
4	$\frac{1}{2}$		2	5	$\frac{1}{4}$
2	$\frac{1}{2}$		1	2	$\frac{1}{2}$
8dr.	$\frac{1}{4}$			3	$\frac{1}{2}$
4	$\frac{1}{2}$			1	$\frac{1}{4}$
1	$\frac{1}{4}$				$\frac{1}{2}$

Answer 18761, 15 7 $\frac{3}{4}$

To any Person conversant in Figures, the Difficulties of this Operation are very obvious, when compar'd with mine; and the Deficiency of Nine-pence arises from the several Fractional Parts of the Farthings; which though of little Consequence in so large a Sum, is sufficient to prove the Correctness of this New Method; and for a Conviction of its Brevity, let the Reader try

G

the Working this Example, either by Decimals, or any of the common Methods ; sufficient Examples having been given for the Truth of their Operations in Practice, &c. I shall next consider them with respect to

I N T E R E S T.

AN D under this Head it must be observed, that whenever Months, or Weeks are blended with Days, it will be most convenient to bring the whole into Days, for the more ready finding the Solution, and then multiply them by 275 ; but when Months or Weeks are consider'd separately, they may then be separately multiply'd by their governing *Factors* for a Solution, as observ'd under the Rule (Time.) And it may be here Necessary to observe, that Decimal Tables and other Operations by Decimal Arithmetic, have been generally used for the more correctly finding Interest on Money, as being judg'd not only the most Correct, but the most Concise of any Method yet discovered : But it now remains for me to shew with how much Advantage it may be perform'd by this New Method, which if attended to, will render all Tables, and portable Assistances quite unnecessary.

And in the first Place, it will be proper to observe, that I have only one fix'd Rate (*i. e.*) 5 per Cent. in the following Calculations ; but the Amount of any given Sum at any Rate, may be found by taking the following Proportions of the Product found at 5 per Cent. *viz.*

At

At 3 per Cent. take $\frac{1}{3}$ of the Product and divide the total by 2.

4 - - - - - $\frac{1}{3}$ and Subtract it.

6 - - - - - $\frac{1}{3}$ and add to it.

7 - - - - - $\frac{2}{3}$ and add to it.

8 - - - - - $\frac{3}{3}$ and add to it.

9 - - - - - $\frac{4}{3}$ and add to it.

10 - - - - - double the Answer.

I shall begin my first *Example*, by shewing the common Method of finding the Interest of any Sum of Money for a Year; which is to Multiply the given Principal by the Interest of 1 Pound for a Year, which

$$\text{at } \left\{ \begin{array}{c} 4 \\ 5 \\ 6 \end{array} \right\} \text{ per Cent. is } \left\{ \begin{array}{c} ,04 \\ ,05 \\ ,06 \end{array} \right\}$$

Illustration.

What is the Interest of £450 for a Year at 5 per Cent.

$$\begin{array}{r} 05 \\ \hline 2250 = £ 22..10. \end{array}$$

What is the Interest of £4727 at 4 per Cent. for a [Year.

$$\begin{array}{r} ,04 \\ \hline 189,08 = £ 189..1..7. \end{array}$$

What is the Interest of £747..12..6 for a Year at 5

747,615 the Decimal [per Cent.

× by ,05 the Rate of Interest.

$$\begin{array}{r} \hline 37,38125 = £ 37..7..7. \end{array}$$

But the Interest of any Sum for one Year. By THE NEW METHOD, is found by reducing the Principal to a Decimal, and the Figures on the Left-Hand of the Decimal Point are Shillings,

and those on the Right, are to be valued as Pence and Farthings, viz.

Example.

Find the Interest of £ 747..12..6 for one Year at 5
747,625 [per Cent.

Here the given Principal is reduc'd to a Decimal, the 747 being Shillings, and the 625 must be valued as Pence, according to the foregoing Observation, viz.

2)0 747, 625 to find the Pence $\times 12$

$$\begin{array}{r} 12 \\ \hline 37,7 \hline 7,500 \\ 5 \\ \hline 2,000 \end{array}$$

Then $37..7..7 \frac{1}{2}$ is found to be the Interest of 747..12..6 for one Year at 5 per Cent. and in Case you require at any other Rates, it is only performing the Operation as directed in Page 43.

Find the Interest of £ 427..16..4 $\frac{1}{2}$ for 7 Years at 5 per Cent.

Observe that the Comma, thus (,) is to be considered as the Point of Separation, and the | or long Stroke to be only cutting off the Figure for the Division by 20.

427,819 the Principal decimated.
7 the Number of Years.

2)0 2994,733 cutting of always in the Product
Answer 149..14..8 $\frac{1}{2}$ so many Places of
Decimals as are contained in the Principal Decimal.

OBSER

OBSERVATION.

Was it required for Months, Weeks, and Days ; the Months may be broke out of the principal Decimal, and the Weeks reduced into, and added to the Days, and multiplied by 275 as in the following Example by the New Method, *viz.*
Find the Interest of £ 328..14..9. $\frac{3}{4}$ at 5 per Cent.
for 4y. 9m. 3w. and 5 Days.

Then 328,741 the Decimal of the Principal for 1
x by 4 the Number of Years. [Year.

Mon. 1314,964 Interest for 4 Years at 5 per Cent.

6 .. $\frac{1}{2}$ 164,3705

3 .. $\frac{1}{2}$ 82,1852

1561,5197 7 = £78..1..6. the Interest for 4
[Years and 9 Months.

275

26 Days in 3 Weeks and 5 Days.

1650

550

,07150 Decimal being under 30 Days a
328,741 Principal [Cypher is prefix'd.

7150

28600

50050

57200

14300

21450

23,50498150 = 1..3..6 for 26 Days
78..1..6 for 4y. 9 Mon.

Interest for 4y. 9. m. 3 w.

5 Days. See Proof. £ 79..5..0

Proof

Proof of the Foregoing.

$$\begin{array}{r}
 \text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741 \\
 \hline
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 5 \\
 \hline
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 16,437(05 \\
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 4 \\
 \hline
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 65,748 \quad \text{Int. of 4 pr.} \\
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 6 \frac{1}{2} \quad 8,218 \\
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 3 \frac{1}{2} \quad 4,109 \\
 \hline
 \phantom{\text{If } \text{£.} \quad 100 \quad \text{£.} \quad 5 \quad \text{£.} \quad 328,741} 78,075 = \text{£} 78..1..6.
 \end{array}$$

$$\begin{array}{r}
 \text{Days.} \quad \text{£.} \quad \text{Days.} \\
 \text{Then if } 365 \quad 16,437 \quad 26 \\
 \hline
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 26 \\
 \hline
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 98622 \\
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 32874 \\
 \hline
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 365)427362(1,170 = \text{£} 1..3..5. \\
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 365 \dots \\
 \hline
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 623 \\
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 365 \\
 \hline
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 2586 \\
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} 2555 \\
 \hline
 \phantom{\text{Then if } 365 \quad 16,437 \quad 26} \dots 312
 \end{array}$$

The Interest for the 26 Days by the Stating, will give us no more in the Quotient, than £1..3..5; but as there is a Remainder in the Division of 312 or $\frac{312}{365}$ of a Penny, which is more than

than 3 Farthings; one Penny may therefore be reasonably allow'd for the same, which will bring the Answer the same as by the *Factors*: It must be evident in this Example, that the Method by the *Factors*, is not only more expeditious, but more certain and correct; as the Fractions by that Method of Operation are very inconsiderable, if of any Value at all:

More Examples in Simple Interest.

What is the Interest of £ 920. for 1 Year at 5 per Cent. per Ann.

$$210)920, = £ 46. \text{ Answer.}$$

Example.

What is the Interest of £ 437. for 2 Year at 6 per Cent. per Ann.

437, for 5 per Cent.

87,4 $\frac{1}{5}$ taken to value it at 6 per Cent. as
[given in the Rule.]

$$52|4,4 = £ 26..4..4. \frac{3}{4} \text{ Answer.}$$

Example.

What is the Interest of 643..13..6 for 3 Weeks at 6 per Cent. per Ann.

192 Factor for Weeks 443,675

3

,0576

,576

3862050

4505725

3218375

$\frac{1}{5}$ to find for 6 per Cent. 37,0756800 Interest at 5
7415136 [per Cent.]

$$44,490816 = £ 2..2..6. \text{ Ans.}$$

Example.

Example.

What is the Interest due on a Bond of £ 578..17..4.
for 1 Year 6 Months and 19 Days, at 5 per
Cent. per Annum.

578,866 for a Year.
6.. $\frac{1}{2}$ 289,433 for 6 Months.
30,245 for the 19 Days

898,544 = £ 44..18..10. Answer.

275
19

2475
275

505225
578,866

131350
31350
41800
41800
36575
26125

For 19 Days. 30,24574850

Example.

Example.

What is the Interest on a Bond of £841 at £5..10 per Cent. for 1 Year, 8 Months, and 15 Days.

841. Interest for 1 Year at 5 per Cent.

$6\frac{1}{2}$ 420,5

$12\frac{1}{2}$ 140,16

1401,66 for 1 Year and 8 Months.

34,691 for the 15 Days.

1436,351 Int. for whole Time at 5 per Cent.

take $\frac{1}{10}$ 143,635

1579,986 £ = 78..19..11 $\frac{3}{4}$ Interest at £5..10 [per Cent.

$$\begin{array}{r}
 75 \\
 15 \\
 \hline
 1375 \\
 275 \\
 \hline
 16500 \\
 841 \\
 \hline
 4125 \\
 16500 \\
 \hline
 33000
 \end{array}$$

For 15 Days 34,69125

Having said sufficient for the right comprehending the finding the Interest on any Number of Years, and Parts of a Year; I shall make some few Remarks, and give some Examples for the True finding the Interest of any

H

Sum,

Sum, at any Rate, and for any Number of Days.

Examples.

To find the Interest of £ 100 for any Number of Days, you have only to Multiply the given Factor 275 by the Number of Days, and the Product is the Answer in Shillings.

Note. When the Product does not exceed three Figures, it is to be consider'd as Parts of a Shilling, and valued accordingly.

Find the Interest of £ 100 for two Days.

275 the given Factor.
 × by 2 the Number of Days.

Produces ,550 or Six-Pence Half-Penny :
 For the Three last Figures (or the Three if alone) are not to be valued as in the common Valuation of Money ; but only multiply'd by 12 and by 4 ; and the Excess, (if any) separated, as in the above Example.

× by ,550
 12

6,600 Six, the Excess, is cut off for Six-
 4 Pence.

2,400 Two, the Excess, is cut off for 2
 Farthings.

Find the Interest of £ 100 for three Days.

£.

275

3

,825 Or Nine-Pence Three-Farthings.

Find

Find the Interest of £100 for 12 Days.

275

12

3300 Or 3s. 3d. $\frac{1}{2}$.

Here, the Product is more than three Figures by One, which becomes Shillings, and the 300 being valued by the Method before mentioned, gives 3d. $\frac{1}{2}$.

Find the Interest of £100 for 74 Days.

275

74

1100

1925

20350 Here the Three last Figures to the Right being seperated, leaves 20 Shillings: And the 250 prduces 4 Pence, which gives an Answer of £1..0..4.

Find the Interest of £100. for 124 Days.

275

124

1100

550

275

34,100 Or, 34 Shillings and one Penny.

But it may sometimes be requir'd to bring these Solutions to a proper Decimal, in Order for their more readily working with other Decimal

Operations. For the Performance of which, take the following General

R U L E.

Divide the Product by 2, and the Quotient is the Decimal.

Noting 1st. That if the Product has only 3 Places, a Cypher must be prefix'd, and the Decimal become perfect.

2dly. If the Product consists of 4, or more than 4 Figures, no Cypher is to be prefix'd after the Division by 2.

Note. 3ly. If after the Division by 2, the Quotient consists of 5, or more than 5 Figures, the Point of Separation is between 4th. 5th. Figures, and the Figures to the Left Hand become whole Numbers: Let us for Illustration of this Rule, Decimate the foregoing

EXAMPLES, viz.

Decimate $2)550$

$,0270$ a Cypher being prefix'd as the Product has only three Places, it becomes $,0270 = 6d. \frac{1}{2}$.

Decimate $2)825$

$,04125 = 9d. \frac{3}{4}$.

Decimate $2)3200$

$,1650$ here as the Product consists of 4 Figures (i e.) 3200, no Cypher is prefix'd after the Division by 2, and the Decimal is $,1650 = 3s. 3d. \frac{1}{2}$.

Decimate

Decimate $2)20350$

1,0175 Here, after the Division by 2, the Quotient consists of 5 Places, and the Point of Separation is between the 4th and 5th Figures as in Note 3d, and the 1 becomes a whole Number, and the Decimal £ 1..0..4.

Decimate $2)34100$

1,7050 Or, £ 1..14..1.

It will be necessary now to return to give more Examples in finding Interest for Days, viz.

Find the Interest of £ 250 for 27 Days.

$$\begin{array}{r} 275 \\ 27 \\ \hline \end{array}$$

$$\begin{array}{r} 1925 \\ 550 \\ \hline \end{array}$$

× by $\begin{array}{r} .07425 \\ 250 \end{array}$ the Interest of £ 100 for 27 Days.
the Given Principal.

$$\begin{array}{r} 371250 \\ 14850 \\ \hline \end{array}$$

18,56250 = 0..18..6, the Interest of £ 250
[for 27 Days.]

Examples.

Examples.

Find the Interest of £214..12..6. for 97 Days at
5 per Cent.

275 the given Factor.
* by 95 the Number of Days.

$$\begin{array}{r}
 1925 \\
 2475 \\
 \hline
 26675 \\
 214,625 \text{ Decimal of Principal Money.}
 \end{array}$$

$$\begin{array}{r}
 133375 \\
 53350 \\
 160050 \\
 106700 \\
 26675 \\
 53350 \\
 \hline
 \hline
 \end{array}$$

57,25121875 = 57 Shillings and a Fraction
[or £2..17..3.

Find the Interest of £750 at 5 per Cent. for 4
Months.

N. B. *Although it has been a general received Method, after finding the Interest for a Year, to break out the Aliquot Parts thereof; yet I would recommend the Multiplying the given Principal by 834, the Factor for Months; and that Product by the given Principal, which will give you the Answer in Shillings, viz.*

Example.

Example.

What is the Interest of £ 750 at 5 per Cent. for 4 Months.

$\times$ by $\frac{834 \text{ Factor for Months.}}{4 \text{ the Number of Months.}}$

3336

750 the given Principal.

166800

23352

250,2000 Answer £ 12..10..2 $\frac{1}{4}$.

What is the Interest of £ 725..12..6 at 5 per Cent. for 11 Months.

$\times$ by $\frac{834 \text{ Factor.}}{11}$

9174

26,527

64218

1835

459

55

1

665,68 = £ 33..5..8. the Answer.

Let the Reader try the tedious Operation of breaking out 11 Months after having found the Interest for a Year, as by the common Method, as a Conviction of the Ease and Brevity of this.

Find

Find the Interest of £550 at 5 per Cent. for 7 Years, and nine Months.

834 Factor.

× by 9

prefixing 7 for the
Number of Years. }

7,7506

,055 the given Prin-
[cipal.

387530

38753

4262,83 = 4262 Shillings
and a Remainder

83 = £213..2..9. $\frac{3}{4}$
or the Interest re-
quired.

Find the Interest of £250 for 5 Weeks at 5 per Cent.

193 Factor for Weeks.

× by 5 Number of Weeks.

,0965

052

1930

482

24,12 = 24 Shillings and a Re-
mainder of 12. or £1..4..1. $\frac{1}{4}$.

Find

Find the Interest of £643..13..6. for 3 Weeks at
6 per Centum per Annum.

$$\begin{array}{r}
 193 \\
 3 \\
 \hline
 ,0579 \\
 576346 \\
 \hline
 3474 \\
 232 \\
 17 \\
 3 \\
 \hline
 \end{array}$$

37,26 = 37 Shillings and 26 Re-
7452 mainder to which $\frac{1}{5}$ being
—— added, because at 6 per Cent.
44,712 it produces, 44,712, or
£2..4..8. $\frac{1}{2}$

I shall conclude my Observations, on Interest
with the following

Example.

What is the Interest due on a Bond of 578..17..4.
dated the 22d. of June 1763, this being the
Tenth of January 1765.

June has	— 8
July	— 31
August	— 31
September	30
October	— 31
November	- 30
December	- 31
January	- 10

202 Days.

((58))

202 Days.

275 the given Factor.

1010

1414

404

prefixing 1 for
the Number of
Years.]

1,55550

668,875

the given Principal.

777750

108885

12443

1243

93

9

900,423 = 900 Shillings and a
Remainder of 423, or
£ 45..0..5. $\frac{3}{4}$.

Compare this with the Statings, and number of
Figures necessary for its Performance by common
Arithmetic.

F I N I S.

ERRATA, and AFTER THOUGHTS.

IN Page 4, under the Factor for Time, instead of 275, read 274. In Page 17, for dwts, read drs. In Page 23, in dividing the Ounces by 16, the last Figure in the Quotient must be one less than it will go, in Order for the Remainder coming out more than the Divisor—or, a better Way will be, at once to deduct 4 from the produc'd Ounces. In Page 29, instead of adding 2 for every Ten, divide the Product of 2 by 5. In Page 30, line 22, for was, read is. In calculating the Interest for Days, 274 will prove a more elligible Factor than 275.

230.1
4

ERRATA, and ALTHOUGH THOUGHTS.

In Page 4 under the Factor for Time, instead of 2.2, I read 2.4. In Page 17, for every, read 2. In Page 20, inverting the Order by 2, the last figure in the Quotient must be one less than it will be, in Order for the Remainder coming out more than the Divisor—of a better Way will be, at once to deduct 4 from the product Quotient. In Page 20, instead of adding 2 for every Ten, divide the Product of 2 by 10. In Page 20, for 22, read 12. In calculating the interest for Days, 224 will give a more eligible 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.